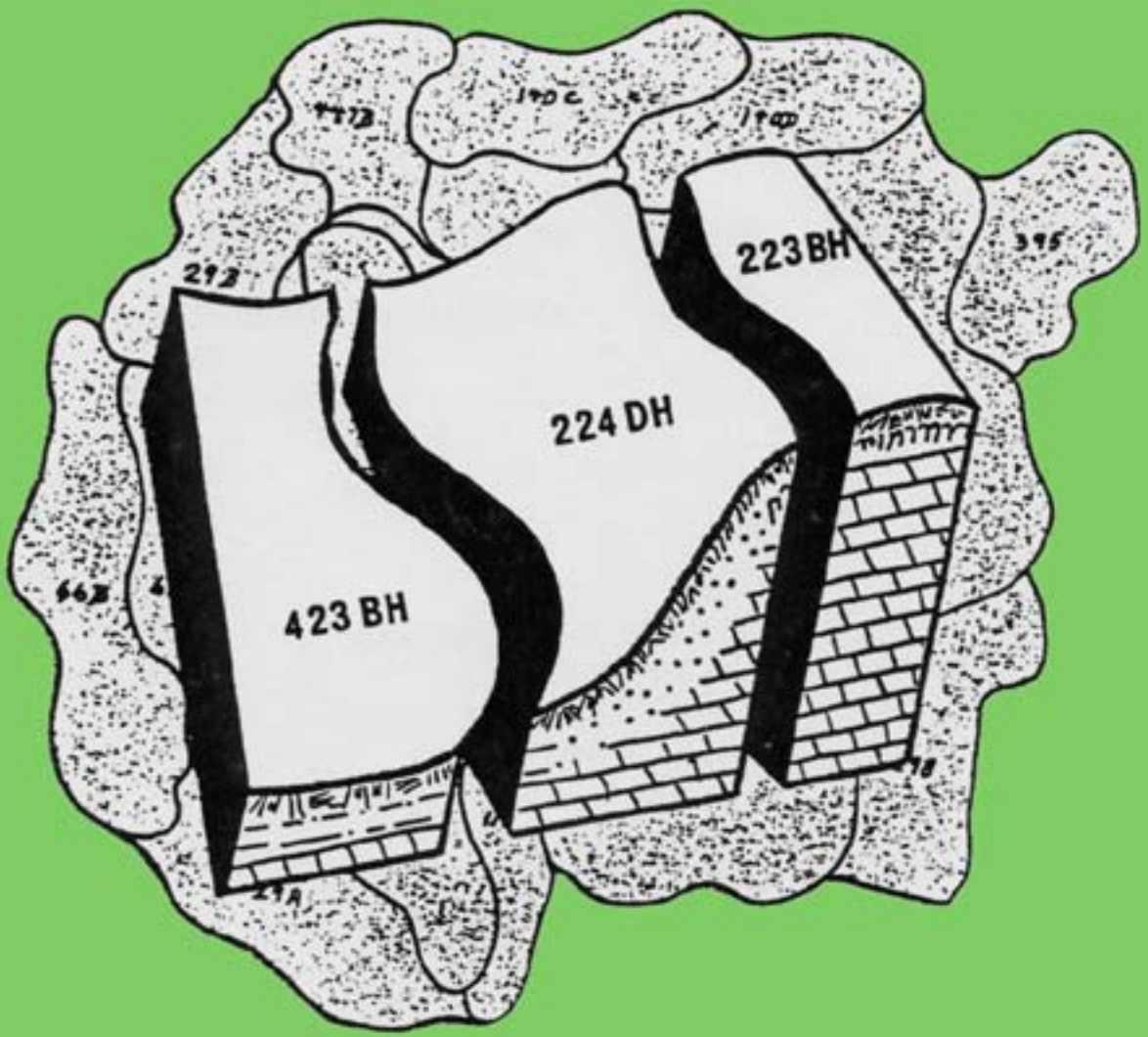
HIGH INTENSITY SOIL MAPS FOR NEW HAMPSHIRE

STANDARDS



Sponsored by the Society of Soil Scientists of Northern New England
SSSNNE Special Publication No. 1

SOCIETY OF SOIL SCIENTISTS
OF NORTHERN NEW ENGLAND
P.O. Box 76 • Durham, NH 03824

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Cover designed by June Tucker

INTRODUCTION

The SOCIETY OF SOIL SCIENTISTS OF NORTHERN NEW ENGLAND is a non-profit professional organization of soil scientists, both in the private and public sectors, that is dedicated to the advancement of soil science. The Society fosters the profession of soil classification, mapping and interpretation, and encourages the dissemination of information concerning soil science. With the intent of contributing to the general human welfare, the Society seeks to educate the public on the wise use of soils and the associated natural resources.

These standards for making high intensity soil maps have been developed for use in New Hampshire. The Society is available to assist in developing standards for use in Maine and Vermont. Some demonstrated uses of these standards in New Hampshire include: lot size by soil type ordinances, use in local subdivision regulations that incorporate septic tank leach field (4K receiving area) set-back distances from sensitive soil conditions and in wetland delineation activities (hydric soils). Soil drainage classes used in these standards have been updated to more closely align with the concepts used by New Hampshire Department of Environmental Services. It should be noted that the accuracy of soil line placement serving as delineation for any jurisdictional wetlands or hydric soil boundary may be more restrictive than outlined in these standards.

Comments or inquiries on these standards may be directed to the Board of Directors at the following address:

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Standards For A High Intensity Soil Map

New Hampshire

Criteria for High Intensity Soil Map:

1. Use of a Base Map.
2. Use of a Connotative Soil Legend (see attachment—Key to Soil Types).
3. Required Map Unit Purity.
4. Minimum Size Delineation.
5. Required accuracy of soil boundary line placement.
6. Map prepared by a Certified Soil Scientist or by an apprentice working under direct supervision of said certified soil scientist.

Base Map:

1. A current perimeter survey by a Licensed Land Surveyor.
2. Map scale of 1" = 100' or larger, i.e. 1" = 50', 1" = 20', etc.
3. Topography with 2-foot contour intervals or less, i.e. 1 foot contour intervals.
4. Ground control is required and shall be at the density specified by the Soil Scientists.

   The following guidelines are recommended:
   1. Four identified points or features per acre.
   2. Uniformly distributed throughout the parcel.
   3. Points or features will be shown on base map.

Connotative Soil Legend:

(See attachment—Key To Soil Types)

Areas mapped with Symbol B-6 will be identified within the map unit or map unit legend as to what it is, i.e. fill, excavated or regraded. All map unit symbols used will be derived from the Connotative Soil Legend with only one soil type per map unit delineation.

High Intensity Map Unity Purity:

The soil within an area enclosed by a soil boundary line (a map unit delineation) will have a minimum of 75 percent of the soil properties inferred by the soil map symbol derived from the Key To Soil Types and placed within that map unit delineation. Limiting soil type or types can make up a maximum of 15 percent of the map unit delineation. The control section for determining soil properties is from the soil surface to a depth of 40 inches.

User Note:

This item warrants additional discussion. However, for this issue the user is encouraged to refer to pages 5 to 7 of the publication, "Site-Specific Soil Mapping Standards for New Hampshire" version 2.0 dated January 1999. Parts of the discussion relate to High Intensity Soil Map Standards (Components on the pie chart, page 6).

Minimum Size Delineation:

The minimum size delineation will refer only to map units of poorly drained, very poorly drained, rock outcrop or slopes of greater than 25 percent. The minimum size delineation will be 2000 square feet. Smaller areas may be shown at the discretion of the Soil Scientist.

Soil Boundary Line Placement:

Soil boundary line placement should be accurate within 20 feet.

If any soil boundary is to be used for setback requirements or other permitting requirements, it will be flagged in the field, located and shown on the Soil/Plan map.

Streams and small water bodies shown at the discretion of the Soil Scientist.

Certified Soil Scientist:

A person qualified in soil classification and mapping, who is certified by the State of New Hampshire under RSA 310. All high intensity soil maps will be identified with the name of the certified soil scientist.

It should be noted that:
THESE ARE MINIMUM STANDARDS FOR HIGH INTENSITY SOIL MAPS.

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KEY TO SOIL TYPES

This key is used in determining soil types that are utilized in high intensity soil surveys. The soil types are defined as soils having the same soil characteristics of drainage class, parent material, restrictive features, and slope; and are designated by a five part symbol, the parts being A, B, C, D and E.

SYMBOL: A Drainage Class

1 - Excessively drained
2 - Well drained
3 - Moderately well drained
4 - Somewhat poorly drained
5 - Poorly drained
6 - Very poorly drained
7 - Not determinable (to be used only with Symbol B-6)

SYMBOL: B Parent Material

1 - Glaciofluvial Deposits (outwash / terraces of sand or sand and gravel).
2 - Glacial Till Material (active ice)
Marine or Glaciolacustrine Deposits (3, 4 or 5)
3 - Very fine sand and silt deposits (glacial lakes)
4 - Loamy / sandy over silt / clay deposits
5 - Silt and clay deposits (ocean waters)
6 - Excavated, regraded or filled (see Connotative Soil Legend)
7 - Alluvial Deposits (flood plains)
8 - Organic Materials—Fresh Water Bogs, etc.
9 - Organic Materials—Tidal Marsh

(continued…)

SYMBOL: C R**estrictive Features** (if more than one applies, list the most restrictive)

1 - None
2 - Bouldery, with more than 15% of the surface covered with boulders (larger than 24 inches in diameter).
3 - Mineral restrictive layer(s) are present in the soil profile less than 40 inches below the soil surface—such as hard pan, platy structure, and clayey texture. For examples of soil characteristics that qualify for restrictive layer, see Soil Manual for Site Evaluations in New Hampshire, 2nd Ed., page 3 – 17, figure 3 – 14.
4 - Bedrock present in the soil profile 0 – 20 inches below the soil surface (Bedrock is either a lithic or paralithic contact—See *User Note: Soil Taxonomy*.
5 - Subject to flooding.
6 - Does not meet fill standards (see addendum—Standards For Fill Material) (only to be used with Symbol B-6).
7 - Bedrock present in the soil profile 20 to 40 inches below the soil surface. (Bedrock is either lithic or paralithic contact; see *Soil Taxonomy*).
8 - Areas where depth to bedrock is so variable that a single soil type cannot be applied, will be mapped as a complex of soil types and will have a symbol C of 8.

SYMBOL: D Slope Class

B - 0% to 8%
C - 8% to 15%
D - 15% to 25%
E - 25% +

SYMBOL: E - High Intensity Soil Map Identifier—H. (see addendum)

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Addendum to KEY TO SOIL TYPES

1. Standards for Fill Material:

Fill material consisting of organic materials or non-soil materials such as tree stumps, sawdust, wood chips and bark, bricks, asphalt, concrete, metal, wallboard, etc., even with a soil matrix, should not be used.

The in-place fill should have less than 15% organic matter and non-soil materials by volume.

The in-place fill should not contain more than 25% by volume of cobbles (6 inch diameter) and stones (larger than 12 inches in diameter).

The in-place fill should not have more than 27% by weight of clay size (0.002 mm and smaller) particles.

The fill should be essentially homogeneous. If bedding planes and other discontinuities are present, detailed analysis is necessary.

2. Examples of soils classified using the KEY TO SOILS TYPES:

a. An excessively drained sand and gravel soil with no restrictive features on a 9% slope would be identified as: 111CH.

b. A moderately well drained glacial till soil with a hard pan, on a 4% slope, would be identified as: 323BH.

c. A somewhat poorly drained clayey soil with firm consistency and high clay content in the substratum, on a 1% slope, would be identified as: 453BH.

d. A very poorly drained organic soil located on the tidal marsh would be identified as: 691BH.

(section continued…)

e. An area of well drained glacial till where bedrock is present, and the shallow soils are so intermixed with deep soils that they cannot be separated, on a 16% slope, would be identified as: 228DH

f. An area that was filled with stumps and concrete blocks such that the fill material would not meet the Standards For Fill Material, on a 2% slope, and the depth to a seasonal high water table could not be determined, would be identified as: 766BH

3. High Intensity Soil Map Identifier:

The H is placed at the end of the soil type to identify the area mapped as meeting the standards for high intensity soil maps. If, as a preliminary planning tool, a soil map is made that does not meet the standards, but the soil scientist still prefers to use the connotative legend to identify the soils, a P (signifying a preliminary map) will be used in place of the H, i.e. 111CP. Maps made with soil types ending with P do not meet the standards for high intensity soil maps and are not intended to be used for wetland ordinances, lot size by soil type regulations, etc.

KEY TO SOIL DRAINAGE CLASSES

Where first part of map symbol is 6—VERY POORLY DRAINED

A. Soils that have aquic conditions and one of the following field indicators:

II, III.A, III.B, III.C, and III.G.1.

By reference using the publication; "Field Indicators for Identifying Hydric Soils in New England", Version 2, July 1998. The enclosed soil field notes form may be helpful in making determinations.

Where first part of map symbol is 5—POORLY DRAINED

B. Soils that have aquic conditions and one of the following field indicators:

III.D, III.E, III.F, III.G.2, III.G.3, III.H, and III.I.

By reference using the publication cited in A above.

User Note: These indicators are for natural soil conditions. For human disturbed soils (fill, etc.), poorly drained soils may be found that do not key out using B.

Where first part of map symbol is 4—SOMEWHAT POORLY DRAINED

C. Soils that have 5 percent or more distinct or prominent mottles that are not relic mottles, at a depth less than 15 inches below the soil surface; are SOMEWHAT POORLY DRAINED.

Where first part of map symbol is 3—MODERATELY WELL DRAINED

D. Soils that have 5 percent or more distinct or prominent mottles that are not relic mottles, between a depth of 15 inches and 40 inches below the soil surface; are MODERATELY WELL DRAINED

Where first part of map symbol is 2—WELL DRAINED

E. Solis that have textures in any horizons between 10 to 40 inches of very fine sand or finer; are WELL DRAINED.

F. All other soils are—EXCESSIVELY DRAINED and are noted where first part of map symbol is 1.

GLOSSARY

ALBIC HORIZON—one from which clay and free oxides have been removed or in which oxides have been segregated to the extent that the color of the horizon is determined by the color of the primary sand and silt particles rather than by coatings on these particles. See *User Note: Soil Taxonomy*.

AQUIC CONDITIONS—implies a reducing regime that is virtually free of dissolved oxygen because the soil is saturated by ground water or by water of the capillary fringe. The concept includes reduction of iron and the presence of redoximorphic features. See *User Note: Soil Taxonomy*.

EXCAVATED—areas where soil material has been removed. Surface and subsoil layers, or horizons, are absent, or occur as remnants lacking horizon continuity from which a naturally developed soil profile can be identified.

FILL—areas where soil or non-soil material has been mechanically placed covering the natural land surface. The fill is 12 inches or more in thickness on greater than 50% of the area.

HIGH INTENSITY SOIL MAP UNIT—is an area defined and named in terms of its soil properties. Each individual area enclosed on the map is a delineation. Each map unit contains a map symbol and that symbol represents one soil type with a defined set of soil properties.

HISTIC EPIPEDON—is a layer, normally at the surface, that has a high volume of organic soil materials. See *User Note: Soil Taxonomy*.

HYDRIC SOIL—a soil that is saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions in the upper part.

LIMITING SOIL—is a soil that differs appreciably in one or more soil properties than the named soil type. The difference in soil properties is more restrictive than the named soil type. The limiting soil type is 2 or more drainage classes different from the named soil type, or has 1 or more restrictive features or has slopes greater than 15% if the named soil type is B slope or C slope.

MINERAL SOIL MATERIALS— See *User Note: Soil Taxonomy*.

MOTTLES—refers to spots of contrasting colors in a horizon, with either or both high chroma and low chroma represented in the variegated colors. May or may not be related to wetness.

NON-LIMITING SOIL—is a soil type that has most soil properties common to the named soil type. The non-limiting soil is 1 drainage class different, or, has a different parent material, or is any slope class lower than the named soil type, and has no additional restrictive features.

ORGANIC SOIL MATERIALS: See *User Note: Soil Taxonomy*.

REDOXIMORPHIC FEATURES— See *User Note: Soil Taxonomy*.

REDOXIMORPHIC FEATURE CONTRAST—refers to the degree of visual distinction that is evident between associated colors. Contrast may be described as faint, distinct, or prominent and the colors are related to wetness.

Faint: Evident only on close examination. Faint mottles commonly have the same hue as the color to which they are compared and differ by no more than 1 unit of chroma or 2 units of value. Some faint mottles of similar but low chroma and value differ by 2.5 units (one page) of hue.

Distinct: Readily seen but contrasts only moderately with the color to which they are compared. Distinct mottles commonly have the same hue as the color to which they are compared but differ by 2 to 4 units of chroma or 3 to 4 units of value; or differ from the color to which they are compared by 2.5 units (one page) of hue but no more than 1 unit of chroma or 2 units of value.

Prominent: Contrast strongly with the color to which they are compared. Prominent mottles are commonly the most obvious color feature of the section described. Prominent mottles that have medium chroma and value commonly differ from the color to which they are compared by at least 5 units (two pages) of hue if the chroma and value are the same; at least 4 units of value or chroma if the hue is the same; or at least 1 unit of chroma or 2 units of value if hue differs by 2.5 (one page).

REGRADED—areas where the natural soil profile has been disturbed or destroyed by mechanical activity. The surface and subsoil horizons are not recognizable to highly mixed.

RELIC MOTTLES—Often are reddish brown features that are relics of an earlier water table situation. Commonly, relic mottles appear as reddish brown horizontal layers below 3 to 4 feet. They are quite common on exposed faces in sand and gravel pits. The origin of these "iron layers" may be related to a water table situation entirely different than exists today. The water table was perhaps considerably higher than the present water table.

SOIL SURFACE—is the top part of the O horizon that has decomposed so much that most of the original material cannot be recognized with the naked eye (Oe, Oa). The O horizons are layers dominated by organic soil materials.

SOIL TEXTURES—are classes based on fine earth fraction (less 2 mm) of soil with different combinations of sand, silt and clay. The amount of each soil separate contained in a soil sample will determine its texture.

SPODIC HORIZON—a subsurface layer of soil characterized by the accumulation of aluminum oxides (with or without iron oxides) and organic matter; a diagnostic horizon for Spodosols. (See *User Note: Soil Taxonomy*)

UMBRIC EPIPEDON—a mineral surface layer of soil characterized by the accumulation of organic matter to the extent that it has a dark color even when dry. (See *User Note: Soil Taxonomy*.)

USER NOTE: SOIL TAXONOMY

The National Cooperative Soil Survey adopted many significant changes in 1992. Updated concepts on the iron chemistry of wet soils with fluctuating water tables resulted in many new terms. For example, mottles as used in the earlier versions of the HIS standards are replaced with the term redoximorphic features. Users are encouraged to seek other publications for a complete definition of this term and others used by soil scientists in making soils maps. Duplication is beyond the scope of this glossary.

A few titles that may be useful.

1. Keys to the Taxonomic Classification of New England Soils. December 2000. Edited by Sidney A.L. Pilgrim and Michael Cuomo with websites. Copies for $15 from:
   N.H. Association of Natural Resources Scientists
   P.O. Box 110
   Concord, New Hampshire 03302–0110

2. Field Indicators for Identifying Hydric Soils in New England, Version 2, July 1998. Copies for $5.00 from:
   New England Interstate Water Pollution Control Commission
   Boott Mills South
   100 Foot of John Street
   Lowell, MA 01852-1124 Tel: 978.323.7929

3. Keys to Soil Taxonomy, 8th Printing, 1999.
   Copies available from:
   Pocahontas Press, Inc.
   P.O. Drawer F
   Blacksburg, VA 24063-1020

One final note: some very preliminary discussions on bringing HIS map standards under the umbrella of the National Cooperative Soil Survey have been initiated. This subcommittee welcomes any suggestions.

Members/Advisors of SSSNNE Subcommittee

Listed below, in alphabetical order, are the members/advisors of the original SSSNNE subcommittee on high intensity soil mapping that met on May 21, 1986 to create the new standards. Included in the listing are their working titles and their affiliation as the meeting date:

Bredberg, Anthony, Qualified Soil Scientist, NH Soil Consultants
Cogswell, Denise, Soil Scientist, Rockingham County Conservation District
Cuomo, Michael, Qualified Soil Scientist, Olde Barwick Management Corp.
Durgin, Paul, L.L.S., Durgin/Schofield Associates
Gove, James, Soil Scientist, SCS
Hayden, James, District Conservationist, SCS
Jacobs, M. Earnest, Qualified Soil Scientist, Self-employed
Kelsea, Russell, Soil Scientist, SCS
Marceau, David, Soil Engineer, NHWSPCC
Merrill, John, District Supervisor, Rockingham County Conservation District
Mitchell, Eric, L.L.S., Eric C. Mitchell Associates
Morse, Lawrence, Qualified Soil Scientist, NH Soil Consultants
Pilgrim, Sidney, State Soil Scientist, SCS
Rosenberg, Gerald, Soil Scientist, SCS
Rowe, Gene, P.E. and L.L.S., Seacoast Engineering
Rutherford, Robert, Qualified Soil Scientist, Self-employed
Vieira, Frank, Qualified Soil Scientist, Self-employed

July 2002. "The Members of the SSSNNE subcommittee on high intensity soil mapping which worked to incorporate the most recent revisions are Mary Gospodarek, Chair, Sidney Pilgrim, Michael Cuomo and Nancy Rendall."

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RECORD SHEET FOR AMENDMENTS TO THE STANDARDS

Date:	Amendments:
July 11, 1990	Adoption of key to Soil Drainage Classes at SSSNNE meeting held at New England Center, Durham, NH.
October 16, 1993	Adoption of following change at annual meeting, Groton, VT: Key to soil types, page 6, dated 3/1/91. Symbol C, item 4. The change is bedrock present from 40 to 20 inches. 4-bedrock present in the soil profile 0 to 20 inches below the soil surface, etc.
July 16, 2002	Page six, symbol C, add "7-Bedrock present in the soil profile 20 to 40 inches below the soil surface. (Bedrock is either lithic or paralithic contact; See *User Note: Soil Taxonomy*. Page six, symbol C, delete the letter X for variable bedrock depth and replace it with the number 8. The text remains the same except the "X" is replaced with an "8" at the end of the text. Delete pages 9 through 11 and replace with drainage classes from Field Indicators. Below the heading "Key to Soil Drainage Classes" there should be a sub-heading "From Field Indicators for Identifying Hydric Soils in New England, Version 2, 1998." In the Field Indicators, the very poorly drained soils are II, III.A, III.B, III.C and III.G.1. In the glossary, on page 12, delete "Hydric Type A Soil" and "Hydric Type B Soil" entirely. Poorly and very poorly drained are now defined in the text drainage class keys.

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